



Science News-Letter



The Weekly Summary of Current Science

EDITED BY WATSON DAVIS

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ENGINEERING—CHEMISTRY—FUELS

Coal Promises to Provide Gasoline and Oil of Future

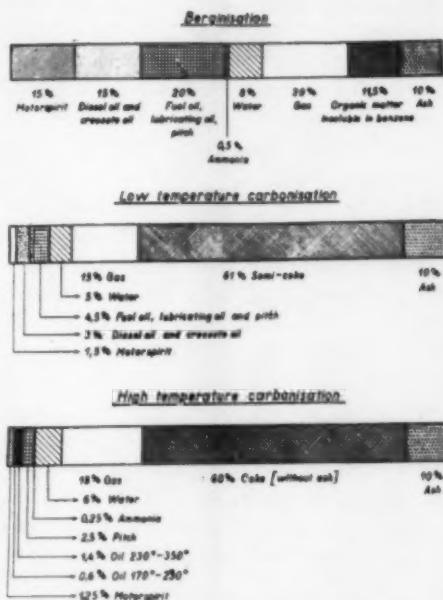
The International Conference on Bituminous Coal held at Pittsburgh, November 15 to 18, under the auspices of the Carnegie Institute of Technology, attracted over 1600 people interested in various aspects of coal production and utilization and there were delegates from twenty countries. The leaders in coal research of Europe and this country contributed to the program. Dr. Edwin E. Slosson reports in the following articles the highlights of the meeting.

How Bergius Liquefies Coal

Gasoline, the most valuable of motor fuels, may be made directly from lignite, the cheapest of coals by a direct and economical process. The inventor of this process for synthetic petroleum, Dr. Friedrich Bergius of Heidelberg, Germany, gave details of the manufacture on a commercial scale of light and heavy fuel oils, lubricating oil, benzene and phenol compounds and ammonia from waste coal dust or low-grade coal.

That the process has passed beyond the experimental stage and is thought likely to become an important factor in the world-wide struggle for new sources of motor fuel is proved by the fact that it has been taken up by strong organizations in Germany, England and in other countries. An international company has been formed to carry on the liquefaction of coal and in this the largest stockholders are the Royal Dutch Shell group, which is the leading petroleum combine of Europe, and the German association of dye manufacturers. The British government is also interested in this method of making artificial oil fuel and a plant for the purpose of investigating the Bergius process has been erected in England. Two experimental plants are maintained in South Germany, employing 150 men.

The discovery of how to convert coal into liquid products is not a lucky accident but the achievement of long and laborious scientific research, such as gave Germany the supremacy in the manufacture of indigo and other synthetic dyes before the war. Dr. Bergius began his study of the composition of coal in 1912 and ex-



YIELDS FROM BITUMINOUS COAL when subjected to various processes. Diagram prepared by Dr. Bergius.

cept for the interruption of the war the investigation has been carried continuously on ever since at the cost of millions of dollars.

The essential principle of the process consists in combining hydrogen gas with coal by means of high heat and pressure. The coal is first ground into small pieces less than a tenth of an inch in diameter, and then mixed with heavy oil to a thick pasty mass. This is placed in a light steel retort and heated to about 800°F. under a pressure of about 3,000 pounds per square inch. Most of the carbon unites with the hydrogen giving a complex mixture of gaseous, liquid and solid compounds similar to those coming from natural wells. In the case of lignite, a low-grade brown coal, as much as ninety per cent of the carbon is transformed into such marketable products. The nitrogen contained in the coal is transformed into ammonia or liquid bases. A ton of common bituminous coal will yield

three hundred pounds of gasoline, four hundred of heavier oils suitable for Diesel internal combustion engines, hundred and twenty pounds of lubricating oils and hundred and sixty pounds of fuel oils. As a rule about forty-five gallons of marketable gasoline can be expected from a ton of soft coal. The second fraction of heavier oils is used in impregnating another batch of powdered coal. Among the products of the process is a quantity of carbolic acid or phenol a familiar antiseptic and also a component of bakelite, used in the radio and the phonograph.

A difficulty of the process, formerly regarded as insuperable, is the high cost of hydrogen. But Bergius gets a sufficient quantity of hydrogen out of the gaseous products of the reaction. Methane, one of these gases, gives four times its volume of hydrogen, when decomposed by steam. The Bergius process can be annexed to an ordinary gas-producing plant, converting the coke into more valuable oils and enabling inferior coal to be used. Dr. Bergius was asked whether his process would pay in the United States but declined to commit himself on the ground of his inexperience with American conditions. He ventured, however, to estimate that the various oil products could be made here at a cost of about ten dollars a ton.

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Coal Competes With Farms

Coal may come into competition with crops and the factory supplant the farm in many cases. This was demonstrated by General Georges Patart before the coal conference.

During the war General Patart was in charge of the manufacture of explosives for the French army and after the war had secured the political independence of France he has de-

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Coal Conference

(Continued from Page 129)

voted his talents to promoting the economic independence of France by studying the possibilities of obtaining a supply of motor fuel and organic chemicals from domestic sources. In 1921 he invented a method for the manufacture of methyl alcohol from coal and water, which opens the way for the production of an infinite variety of compounds that have hitherto been derived from vegetable or animal sources. Methyl alcohol, otherwise known as methanol or wood alcohol, has been made by the destructive distillation of wood, leaving charcoal as the residual product in the retort. Recently synthetic methanol, made in Germany from coal by a method similar to the Patart process, has come into the American market in large quantities at a price much lower than it can be distilled from wood here. But General Patart estimates that a factory could be set up in the United States at a cost of half a million dollars, which would turn out twenty tons of methanol a day at a cost of twenty cents a gallon. This would enable the United States to meet German competition.

Low grade coal and waste can be utilized as the raw material. The first step in the process is to get the carbon into a gaseous form, which is easily done by passing steam over the hot beds of coal. The product is "water-gas," a mixture of hydrogen and carbon monoxide, the deadly gas that is given off by running an automobile engine in a closed garage. Adding more hydrogen and passing the mixture at high pressure and temperature over a metallic oxide acting as a catalyst, the carbon, hydrogen and oxygen combine to form methanol or a variety of other compounds of these three elements. A ton of bituminous coal will produce a minimum of 800 pounds of methyl alcohol or 480 pounds of butyl alcohol, and this yield may be increased at least 30 per cent. Butyl alcohol has recently come into extensive use in this country as a solvent for cellulose lacquers used on automobiles and furniture as substitute for varnish and paint. It is now made by the fermentation of corn. The new lacquers and airplane dope and artificial leather also make use of acetone and various acids and ethers which likewise may be made synthetically from coal. Methanol by passing its vapor over hot copper is easily transformed into formaldehyde, which under the name of formalin is a familiar disinfectant. Formal-

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STUDY HELPS FOR SCIENCE CLASSES

These articles will be found to be especially useful in class work

GENERAL SCIENCE

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HYGIENE

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(This will fit on a 3 x 5 card.)

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News-Letter Features

Born over four years ago, on March 13, 1922, of the demand and interest of those individuals who had caught a glimpse of *Science Service's* news reports to newspapers, the *SCIENCE NEWS-LETTER* has since proved interesting to laymen, scientists, students, teachers and children.

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Regular articles tell of the happenings in the *skies* and in the great *outdoors*.

Photographs aid in the telling of the week's science.

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A hydrogen stream directed into an arc between tungsten electrodes produces a hotter flame than the one used for oxy-acetylene welding.

Marine engineers find that doors made of plywood glued between thin sheets of metal do not warp under the severe weather conditions encountered at sea.



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Shooting Around the Moon

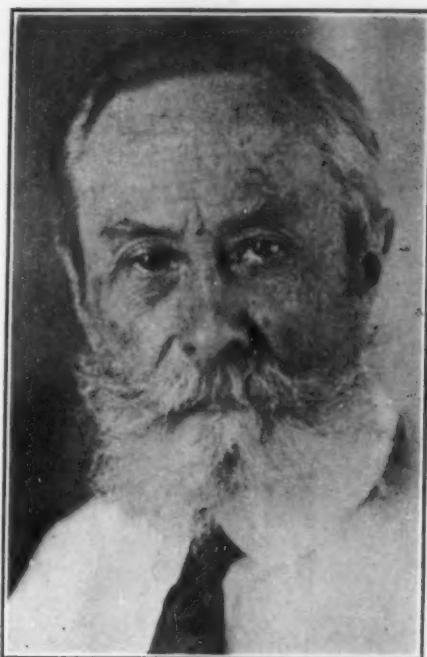
If men from the earth were ever able to reach the moon, by the methods of Jules Verne or H. G. Wells, they could engage in warfare in a way unprecedented on the earth, for the ordinary 75-millimeter field gun would shoot three times as far there as did the German long range gun that bombarded Paris during the war. Though the range of the 75 is about 13,000 yards on the earth, on the moon this would be about 250 miles. Dr. Fred E. Wright, petrologist of the Geophysical Laboratory of the Carnegie Institution of Washington, said in a recent lecture at the Institution.

With the long range gun that bombarded Paris from a point about seventy miles away, and had a muzzle velocity of about a mile a second, the lunar gunner could fire nearly halfway around the moon, nearly 3,400 miles. If the gun were pointed directly upward, its shell would reach a height of a thousand miles above the lunar surface. At a muzzle velocity of a little less than a mile and a half per second, which is not beyond the realms of possibility, the projectile could be fired completely off the moon, at the earth or some other planet if desired. For a projectile to leave the earth, it would have to be fired with a velocity of 18 miles or more per second; or at nearly 7 miles per second, if the earth had no atmosphere.

Dr. Wright has made these studies of the diminished force of gravity and lack of an atmosphere on the moon's surface in connection with the work of a Carnegie Institution committee of astronomers, mathematicians, and geologists who are collaborating in an effort to learn more about the earth's satellite.

"The geologist, accustomed as he is to working with conditions as they exist on the earth's surface, finds himself in a different kind of world when he studies the moon," said Dr. Wright. "The force of gravity to which he is accustomed, being so much less, many phenomena would be different. For example, volcanoes on the earth throw rocks only a short distance, so that they often fall back into the crater from which they came. But moon volcanoes would throw such material much farther. The result would be that the inside floor of the volcanic craters would be lower than the outer surface, just the opposite of the earthly volcanic conditions. Also the craters would be much larger than any on the earth. Telescopic obser-

(Just turn the page)



BAILEY WILLIS

Collector of Earthquakes

Some men collect rare books, but Prof. Willis is a collector of earthquakes, for if he knew where the next important shock was going to occur, he would hasten to the spot! In 1925 he was fortunate enough, from his viewpoint, to be staying in Santa Barbara when the earthquake occurred there, and his observations were of considerable scientific value. Though he is now a resident of California, he doesn't mind discussing quakes that occur there, and he is now active in a campaign to install a chain of delicate seismographs in various parts of the state.

Such a program could also be carried out to advantage in other parts of the country, in his opinion, for to a lady in New England who wrote him to inquire whether her daughters would be in danger of earthquakes in a visit to San Francisco, he replied: "We know something about earthquakes which occur in the Bay country, and I think I can safely say there is no immediate danger of a severe earthquake here. I wish I could say the same about New England!"

Prof. Willis was born in Cornwall, N. Y., on May 31, 1857, and since his graduation from Columbia as an engineer in 1878 has held many geological posts, including various official positions in the United States Geological Survey. In 1915, he went to Stanford University, in California, as professor of geology, becoming professor emeritus in 1922.

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Nobel Prize Awards

The University of Gottingen claims the distinction of harboring two of the latest Nobel prize winners. Prof. Richard Zsigmondy, who has received the 1925 chemistry award, did important work in the development of the ultramicroscope which he utilized in determining the size of the minute suspended particles of colloidal gold.

The work for which Dr. James Franck, now at the University of Gottingen, and Dr. Gustav Hertz, of the University of Halle, who divided the 1925 physics prize between them, are best known in scientific circles, was performed while they were associated at the University of Berlin. This was the first proof of the validity of the quantum theory, which was proposed originally by Max Planck and has caused a revolution in physical science in recent years, by proposing that light and other forms of radiation are not continuous wave motions, as was formerly thought, but consist of separate bundles, or "quanta," of energy.

Franck and Hertz presented their now historic paper before the Berlin Physical Society in 1912. They found that if an otherwise evacuated tube contained a small amount of vapor of mercury, and that if two pieces of metal or electrodes were sealed within so that the atoms of the vapor could be bombarded by rapidly moving electrons, or particles of electricity, a line corresponding to a certain wave length of light appeared when the glow of the tube was analyzed with the spectroscope. But this only occurred when a definite voltage was applied, which meant that unless the electrons were moving with a certain minimum speed, the particular wavelength of light was not given off from the glowing mercury vapor. At the time, Prof. Fritz Haber, greatest of German chemists, is said to have remarked that "this paper will be fundamental in the progress of physics," a prediction which has been amply fulfilled.

Dr. Svedberg, recipient of the 1926 chemistry prize, is an outstanding figure in the realm of colloid chemistry. He recently came to the United States to attend a symposium on colloid chemistry at the University of Wisconsin. He has since returned to the University of Upsala in Sweden.

Prof. Jean Baptiste Perrin of the Sorbonne University at Paris and winner of 1926 physics prize, is well known to scientists for work done on

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Nobel Prize

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the Brownian movement, the name given to the rapid oscillatory motion of minute particles suspended in liquids. Prof. Perrin developed ingenious methods for measuring this movement which showed that the tiny particles behave in the same way scientists have assumed that molecules would act in accordance with the kinetic theory of gases. He has been more recently concerned in studies to show the effect of light on chemical reactions.

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Large arrows pointing north have been painted on 13 lighthouses on the east coast to guide aviators.

Holes drilled by earthworms form innumerable tunnels through which air and water penetrate the earth.

Business letters sent 4,000 years ago were inscribed on clay tablets and put in envelopes also made of clay.

Out of 1,200 employees in a Pittsburgh store, 95 per cent were found to be suffering from correctable defects.

Moles are not blind, but their sight is very poor.

A fleet of about 50 fire boats patrol ports along the United States coast.

The house mouse came to this country from the other side of the world.

The water of the Dead Sea has about 70 times the bromine content of ocean water.

A schoolroom in an English town has been fitted with window panes through which ultra-violet light can penetrate.

Statistics indicate that cancer deaths have increased 47 per cent for males and 21 per cent for females in the past 15 years.

Plans for new buildings at Walter Reed Hospital for disabled soldiers at Washington call for installation of radio equipment.

The ancients valued glass because of its brittleness, and the Roman Emperor Tiberius beheaded an artificer who said he could make glass malleable.

Shooting Around the Moon

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vation shows that both of these conditions actually occur. Another point of marked difference is the lack of erosion forms on the moon. While so many of the earthly surface features are the result of weathering by wind and water, the moon is without atmosphere and moisture and these forms are absent."

Dr. Wright has also been investigating the force of gravity of the earth and is developing a new form of apparatus for measuring its intensity. The standard way of doing it is with a very accurate pendulum, but the method is complicated and a week or more is required to set up the apparatus at any one place and make the readings. The new instrument, which measures the twisting of a spiral tungsten spring due to the earth's attraction, gives promise of permitting readings comparable in accuracy with the pendulum to be made in a few hours.

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A pound of radium gives off as much energy in its lifetime as 400,000 pounds of high grade coal do when burned.

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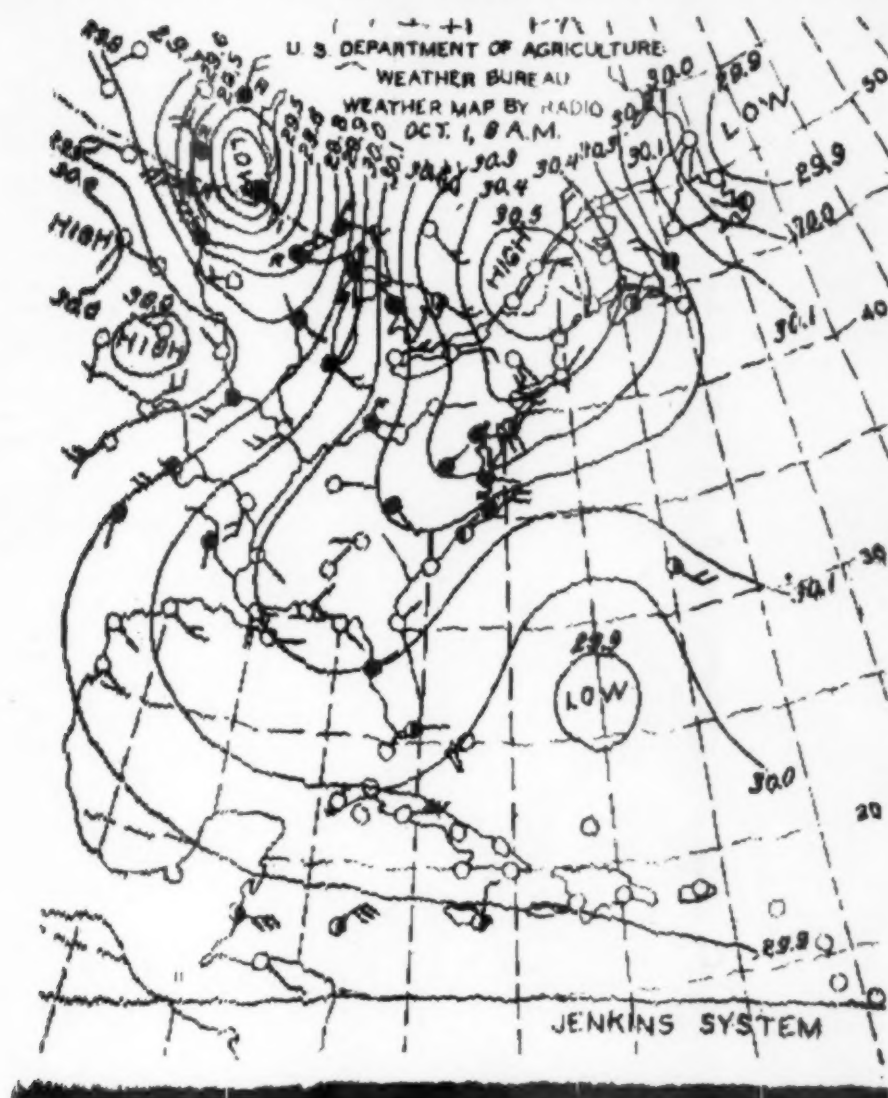
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World Wide Radio Service Aids Weather Prediction



Radio Aids Weather Prediction

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this purpose. Not only did the aeronauts demand prompter service than the weather-reporting system had previously rendered, but they also required information at more frequent intervals and in much greater detail. Recourse was had to radio to meet these demands, and the essential features of the systems then established were retained by the European meteorological services after the war.

In 1919 an international meteorological conference was held in Paris. At this meeting plans were laid for the European radio weather service practically as it exists today. Each country has a network of weather stations at which observations are made at prescribed hours; generally four times a day. The reports of these observations are promptly centralized in each of the countries by radio, wire telegraphy or telephone. In some countries centralization is effected in two stages; district centers collect the reports for their several areas, and then transmit them to the national center.

A time-table has been drawn up by international agreement, assigning to each country certain hours for broadcasting the reports collected within its own territory, and an elaborate cipher code is used for transmission. This system applies not only to the whole of Europe, but also to northern Africa, Syria, Iceland and the Azores; in addition to which Russia broadcasts reports from Siberian stations, and the Eiffel Tower broadcasts reports from numerous places in the United States, Canada, Alaska, the West Indies, etc., together with vessel reports, collected directly or relayed from the United States.

This sounds like an ambitious program, but it is only a part of the vast system of daily weather messages that now crowds the ether. Besides the national broadcasts above mentioned, there are sent out from a few high-power radio stations so-called "international collective reports." Thus the Eiffel Tower broadcasts four times a day reports of observations taken at 50 or 60 places in and about Europe, these being a repetition, in abridged form, of reports previously broadcasted by the various national centers. From these collective messages alone it is possible to draw skeleton weather maps of the whole European area. Somewhat less comprehensive international broadcasts are issued from London, Hamburg, Leningrad and other places.

In addition to these national and

international broadcasts of reports that have a general bearing upon the weather of Europe, many bulletins of a more local character are issued from the national centers and elsewhere. These include weather forecasts for particular areas, special information affecting various flying routes (issued, in some cases, at hourly intervals), forecasts and reports for agriculture, data concerning ice in channels and harbors, and other miscellaneous announcements having to do in one way or another with weather. Since many of the broadcasts above enumerated require a good deal of time for transmission, the entire program of radio weather messages sent out from European stations is a "continuous performance," from midnight to midnight, and during much of the day entails simultaneous broadcasting from two or more places.

Although other parts of the world do not yet vie with Europe in the multiplicity of their radio weather reports, such reports are now issued on an extensive scale in most civilized countries. The United States Weather Bureau still collects reports from weather stations within its own territory by wire, but receives a great number of reports from outlying regions by radio, and broadcasts weather information on a large scale through Naval and commercial radio stations. The broadcasts include data, both in code and in plain language, for the marine and aviation interests, and the twice-daily weather synopses and forecasts with which radio "fans" throughout the country are familiar. Canada, Mexico, the West Indies, some American countries, Australia, New Zealand, China, Japan, British India, the Philippines, South Africa and Madagascar are some of the other regions from which weather data, storm warnings and the like are regularly issued by radio broadcast.

Two novel enterprises connected with the world's radio weather service are the "floating weather bureau" and the radio weather map. During the past five years the French training-ship *Jacques Cartier*, during frequent voyages back and forth across the Atlantic, has served as a clearing-house of weather information for the benefit of mariners and as a means of gathering reports from ships for the use of forecasters on land. Hundreds of such reports are received on board by radio in the course of each voyage, and are charted in conjunction with the reports from land stations on both sides of the ocean. From the charts thus drawn meteorologists attached to the ship prepare weather

forecasts and storm warnings for different sections of the Atlantic, and these are broadcasted on regular daily schedules. Within the next few years it is likely that several ships will be similarly employed in centralizing and distributing weather reports at sea.

Broadcasting numerical data from which weather maps may be drawn by those who have the time and skill to draw them is of much less benefit to humanity than broadcasting the map itself. The latter feat has lately been achieved through the use of an invention of C. Francis Jenkins of Washington. A complete weather map of eastern North America and the western Atlantic is now broadcasted daily from the Naval radio station at Arlington, and some ships have already installed apparatus for receiving it. A weather map of Western Europe is broadcasted from Munich, and one of the North Atlantic, radioed experimentally from Hamburg last spring, was successfully received in midocean.

The joint efforts of several countries will, it is hoped, eventually give us a daily "mosaic" radio weather map of the Northern Hemisphere, to which each country will contribute a certain section. Perhaps we may even have one of the entire globe.

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The Indians made glues from animal and plant substances.

Growing the longleaf pine is advocated as a profitable business in the South by the United States Department of Agriculture.

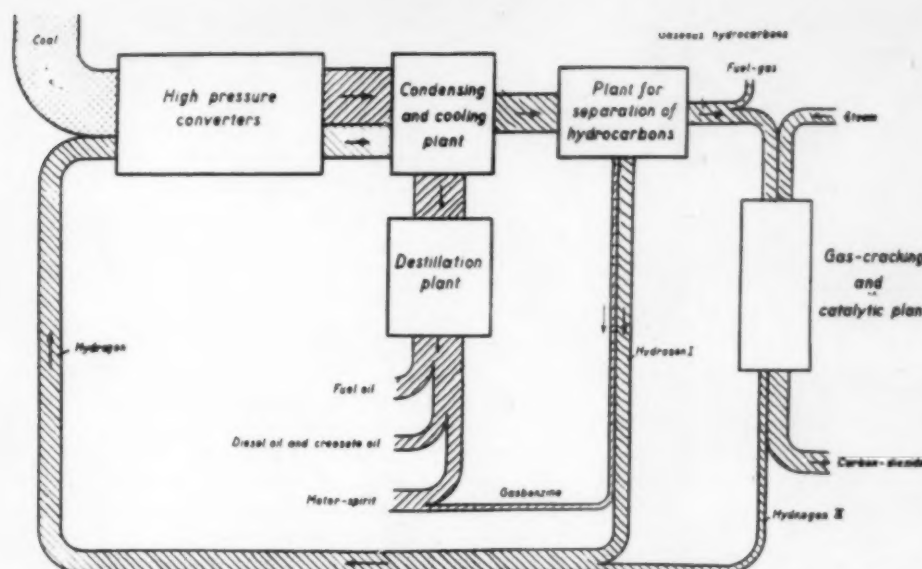
At Yakutsk, Siberia, the temperature goes as low as 82 degrees Fahrenheit below zero in winter, and 102 degrees above in summer.

The Norsemen established a colony in Greenland which flourished for several centuries and then mysteriously collapsed in the fifteenth century.

When George Stephenson, pioneer railroad builder, declared that 15 miles an hour was a practical speed for travel, his sanity was questioned.

Many Indians feared to have their portraits drawn or painted, because they believed that the artist must take some of the life force of the sitter in reproducing his image.

The blood-sweating hippopotamus is so called because its pink underskin shows when the pores of its skin become open, and drops of water rolling off the animal look like blood.



HOW BERGIUS PROCESS CONVERTS COAL TO OIL. This diagram was prepared by Dr. Bergius himself and shows a Bergin plant operating in connection with a plant for the separation of hydrocarbons from the gas.

Coal Conference

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dehyde combined with carbolic acid, also one of the by-products of the process, makes synthetic resins, such as bakelite, which are used for electrical insulation in radio receivers. It has been proved possible to make sugar out of formaldehyde, although this preparation is, at present, merely a laboratory curiosity.

The material for making many fruit flavors and perfumes are found among the products of this process for the liquefaction of coal. Wintergreen oil, a favorite flavor of gum-chewers, is made by combining methanol with salicylic acid, which is likewise a synthetic compound. Substances similar to those found in oil of turpentine are also formed, and this suggests the possibility of sometime making camphor, menthol and rubber from common coal and water. It would be possible though not profitable, to make by such means oils and fats suitable for soapmaking or even those edible. As General Patart pointed out in conclusion, agriculture is essentially an expensive process, involving a large amount of land, a long period of growth, high cost of cultivation and uncertainty of yield. Acetic acid, indigo, and various dyes and drugs are now made synthetically and no one can foresee the end of this new development of applied chemistry.

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Oil Famine Forestalled

"We have not yet a world famine of petroleum, but when it comes there will be available methods for over-

coming it by means of the newer chemistry of coal."

This was the statement of Dr. Franz Fischer, director of the Kaiser Wilhelm Institute for Coal Research at Mulheim in the Ruhr, who spoke before the coal conference.

He backed up his claim showing samples of synthetic petroleum and other forms of motor fuel produced by his process, which consists essentially of passing a mixture of hydrogen and carbon monoxide over finely divided iron or cobalt which serves as a catalyst, that is an agent to accomplish the combination. Half the gases combine in the first passage over the metals and uncombined gases may be again brought into contact with the catalyst. The waste gases that formerly flared from the top of blast furnaces may be employed. The water-gas may also be made from low-grade or refuse coal by passing steam over it when hot.

The Bergius process for the liquefaction of coal requires that the retorts be raised to a red heat and subjected to a pressure of 200 atmospheres but in the Fischer process ordinary air pressure is used and the temperature need not be over 450°F.

Fischer's main motor fuel, which he called synthol, is an oil consisting of various compounds such as the chemist classes as alcohols, ketones, aldehydes and the like. The compounds all contain oxygen and so differ from the natural petroleum which consists solely of carbon and hydrogen.

Dr. Arthur D. Little, Boston chemist, pointed out that if we should have to depend upon synthetic motor fuel

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Bear Story of Past

A bear story, part of which is a million years or more old and part of which has just been finished, was told to the National Academy of Sciences by Dr. John C. Merriam of the Carnegie Institution of Washington. It concerned the fossils of an extinct race of giant bruins which he and his associates discovered in the wilderness of central Oregon, in what is known as the John Day country.

The most critical features of their find were furnished by several molar teeth, which were so closely similar to those of fossil bears found in the Siwalik hills of northern India that it has been necessary to assign the American fossils to the Indian genus, though they constitute a slightly different species. There seems to be little doubt that the wanderings of the extinct Asiatic bruins brought them eventually to western America via a land bridge or a chain of closely set islands in the Bering sea region.

An interesting circumstance connected with their finding, according to Dr. Merriam, is the fact that certain bits of crown and root broken off and missing in the original specimens which he brought in ten years ago, were found this summer by his son Charles W. Merriam, a student at the University of California. The younger Merriam spent his holidays this year combing over the ground his father had searched in 1916, and brought in every fragment of bone he found. Quite by accident Dr. Merriam and one of his associates found that two of the fragments fitted exactly into breaks in the previously incomplete specimens.

These extinct bears, Dr. Merriam stated, were giants of their kind. They were as large as very large specimens of modern grizzly bears, but were shorter in the head and with more massive jaw bones.

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MEDICINE

Hughes Heads Association

Charles Evans Hughes has been elected president of the American Association for Medical Progress to succeed the late Dr. Charles W. Eliot, former president of Harvard University.

For some time in the past Mr. Hughes has served as honorary vice-president of the organization which informs the public concerning the methods and discoveries responsible for man's increasing control over animal and human diseases.

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Coal Conference

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made by Fischer's process it would require all our present output of coal for it takes sixteen hundred pounds of coal to produce a barrel of oil. Government geologists report that our petroleum fields will be exhausted in six years if we continue to use it at the present rate, yet we recklessly waste what German chemists are trying to make.

Science News-Letter, November 27, 1926

"Low Temperature"

To get the most out of bituminous coal the main method that has been in use for the past hundred years is to heat it at high temperature in tight retorts. This divides it into three parts, gaseous, liquid and solid. The gas is used for lighting and heating in cities. The liquid oil and tar can be worked up into thousands of useful commodities, including dyes and drugs. The solid coke finds employment in reducing metals from their ores.

But the new methods of distilling coal make a more economical separation of the by-products by using less heat at the start, although what these experts call "low temperature," some 800 degrees, seems to the layman very high. The researches that Prof. S. W. Parr has carried on for twenty-five years at the University of Illinois on the measurement and utilization of the heating value of coal have at last reached the point of practical application. The vast midcontinental area of bituminous coal known as the Illinois field is estimated to have a reserve supply of fuel twice that of the combined reserve of Pennsylvania and West Virginia and in area it is three times as large as all the European fields. This coal has been regarded as inferior to that of the Appalachian region because it was formerly supposed to be incapable of coking. But Prof. Parr has worked out a method of converting it into a strong dense coke, suitable for domestic use since it gives a smokeless fire. The method consists essentially in heating the coal in two stages. In the first stage the coal is heated for fifteen minutes in a closed rotating drum at a temperature below the point where it softens into a pasty mass. The coal is then poured into a retort and heated to 1,350 degrees Fahrenheit for half an hour.

Coal was first discovered on this continent by Father Hennepin 250 years ago on the north side of the Illinois river opposite Starved Rock. Professor Parr also noted that this

year is the hundredth anniversary of the first scientific investigation of the heating value of coal reported in a paper read by Marcus Dull before the Philosophical Society of Philadelphia in 1826.

Another solution of the smoke problem was offered by C. V. McIntire who has during the past two years devised a method of making artificial anthracite at a demonstration plant put up for the purpose at Fairmont, West Virginia. Anthracite was originally bituminous coal but heat and pressure acting through geologic ages have reduced its volatile matter and increased its density. Mr. McIntire has imitated nature's method of manufacture but speeded the process so it does not take millions of years to effect the transformation. The coal is first heated at comparatively low temperature to drive off the valuable by-products, gas, tar and oil. This leaves in the retort a solid residue of semi-coke which is pressed into briquettes which are reheated to render them dense and smokeless. The yield from a ton of coal is 1480 pounds of semicoke, 31 gallons of tar, two gallons of light oil and three thousand cubic feet of rich gas.

A novel process of coal distillation, turning out a different series of products was described by Harald Nielson, a Danish expert working in England. This avoids the difficulty inherent to the old apparatus, that coal is a poor conductor of heat and while the heat from the outside is spreading to the inner parts of the mass, the volatile oil and tar is being broken up by contact with the red hot steel shell. In the Nielson process external heating is done away with. The coal is run continuously through an inclined rotating retort lined with firebrick while a stream of hot producer gas is passed through the fuel in the opposite direction. This gas flows through the spaces between the pieces of coal, heating up the whole mass evenly and at any desired rate, while carrying off the vapors through the cooler and without cracking them.

Science News-Letter, November 27, 1926

Talking birds speak through the larynx, without using the tongue.

Most of the world's commercial supply of iodine comes from the nitrate fields of Chile.

A beaver trap, by which beavers can be caught alive for propagation purposes, has been invented by a government biologist.

First World Sex Congress

By MAXIM BING

Dr. Bing, Science Service's Berlin correspondent, here reports the highlights of the first sex congress recently held in Berlin.

The First International Congress on Sexual Research is regarded by European sociologists, psychologists and scientists as a long step in advance in handling delicate and difficult questions that have in the past been suppressed and silenced, with much resulting mischief. The mere fact that such a meeting could be held at all, and problems of sex frankly discussed, is pointed out as an index of modern progress away from the ideas our forefathers entertained on the subject.

The chief problems dealt with were the questions of the correlation of internal secretion and sex life, rejuvenation, psychology of sex instincts, new laws concerning the criminality of sex, questions of heredity, of compulsory sterilization of criminals, the attitude of the churches towards questions of sexual ethics and the values of juvenile witnesses in law cases involving sex crimes. The collective opinion of the congress on the question of rejuvenation by surgical means may be summarized by saying that the German theoretical researches entirely accepted the scientific views of Prof. Steinach of Vienna, even hailed him as founder of a new branch of medicine and biology. It was agreed by the majority that his methods applied by surgeons on human beings in cases of premature senility have satisfactory results, although the duration of the effect of this cure is not yet definitely determined. Dr. Harry Smith and Dr. Benjamin of New York lectured on the results of over 500 operations. Prof. Haberland of Cologne disagreed with the majority opinion and showed a number of microscopic sections which he stated showed that the implanted glands are absorbed by the system in a short time, their place being filled up by indifferent tissues. Although he did not absolutely deny an effect if the glands implanted are human ones, he declared that animal glands are absolutely useless.

At the session of the psychologic-neurologic division it was declared that the sexual instinct can not be regarded as a single undivided impulse, but that one has to distinguish at least two separate desires, one being the erotic aiming at sexual union, the other being the parental one, directed at "filling up the universe with human life" as Mrs. Dora Russel of London expressed it.

Socially important was the work done on the problem of curing and protecting against venereal disease. A certain caution was advised in the sexual enlightenment of youth. Progress in the combating of venereal diseases by means of the late Prof. Paul Ehrlich's salvarsan was generally acknowledged.

The attitude of the churches towards the problems of sexual life was dealt with from the Protestant point of view by Prof. B. von Rohden of the theological faculty of Halle University. According to his optimistic notion of life, the erotic instinct of man is regarded as a noble one, which helps men to overcome their egotism, sacrificing their interest to that of companion and family. The Roman Catholic point of view was referred to by Prof. Johann Ude of the theological faculty of Graz University. He stood firmly for the indissolubility of marriage, the absolute refusal of any birth control measures, declared as an aim of love exclusively the production of offspring, declared every other aspect to be sinful.

The practice of compulsory sterilization of sick and criminally disposed individuals, was deprecated by the congress, on the ground that the present knowledge of heredity is insufficient for such drastic measures. Such measures should be taken exclusively as the result of the free, uninfluenced consent of the person in question. The next meeting will be held in 1929 at Rome.

Science News-Letter, November 27, 1926

BIOLOGY

Anti-Evolution In Arkansas

The battles of Tennessee, Mississippi and other Southern states are to be fought over again in Arkansas this winter, according to the *Baptist Advance*, a Fundamentalist publication of Little Rock. While denying the possession of any inside information, the Baptist journal says:

"It is our opinion that a bill will be introduced and passed by the next legislature prohibiting the teaching of evolution (as commonly understood) in the state schools of Arkansas. We believe absolutely that such a bill ought to be passed and we think it likely that it will meet very little opposition if it is drawn in a sensible form."

The editor states that it is his belief that 99 per cent of the preachers of Arkansas and an overwhelming majority of the voters are in favor of such a law.

Science News-Letter, November 27, 1926

Egypt's Inscriptions Saved

Ancient Egyptian buildings along the River Nile are in such condition that the great inscriptions on their walls will be lost forever unless exact reproductions and records are soon made. This fear is expressed by Dr. James H. Breasted, leading Egyptologist and director of the Oriental Institute of the University of Chicago, in a report to the journal of the Archæological Society of Washington, *Art and Archæology*.

Inscriptions on the walls of the Medinet Habu Temple at Luxor are being recorded by field workers of the Institute. The process now used combines in one record three things, Dr. Breasted states: the speed and accuracy of the camera, the skill of the trained and experienced draftsman, and the completeness that is only made possible by the ability of the epigrapher who can read and understand the inscriptions. Making these exact reproductions for scholars to study at leisure in their libraries is a long task. The photographer makes small negatives of the pictures and symbols, section by section. These go through a series of processes of enlargement and tracing to bring out each detail of the ancient signs. At last, the epigrapher takes the final copy that shows the signs as perfectly as the draftsman can make them and goes out to the temple walls to proof read his manuscript from a ladder or scaffold.

To complete and publish the records of this temple will take at least two or three more years, it is estimated.

"It is hoped," Dr. Breasted says, "that this work of 'inscription salvage' may be placed upon a basis sufficiently permanent to permit its continuance to include all the great temples of Egypt, passing from Medinet Habu to the Ramesseum, thence to the Luxor temple, and especially to Karnak, which contains the greatest volume of inscribed records which have survived from the past in a single building. Besides these temple documents there remain furthermore the numerous body of tomb inscriptions and reliefs."

To rescue all of these records would require the work of another entire generation, if not longer, Dr. Breasted believes.

Science News-Letter, November 27, 1926

Only three cases of yellow fever were reported in all North and South America during 1925, according to the Rockefeller Foundation.

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 - 480 Greek
 - 490 Minor languages
- 500 NATURAL SCIENCE—
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 - 520 Astronomy
 - 530 Physics
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 - 550 Geology
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 - 590 Zoology
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 - 670 Manufactures

- 680 Mechanic trades
- 690 Building
- 700 FINE ARTS—
 - 710 Landscape gardening
 - 720 Architecture
 - 730 Sculpture
 - 740 Drawing. Decoration. Design
 - 750 Painting
 - 760 Engraving
 - 770 Photography
 - 780 Music
 - 790 Amusements
- 800 LITERATURE—
 - 810 American
 - 820 English
 - 830 German
 - 840 French
 - 850 Italian
 - 860 Spanish
 - 870 Latin
 - 880 Greek
 - 890 Minor languages
- 900 HISTORY—
 - 910 Geography and travels
 - 920 Biography
 - 930 Ancient history
 - 940 Europe
 - 950 Asia
 - 960 Africa
 - 970 North America
 - 980 South America
 - 990 Oceanica and polar regions

Science News-Letter, November 27, 1926

Science Service

Science Service is a unique institution established at Washington for the purpose of disseminating scientific information to the public. It aims to act as a sort of liaison agency between scientific circles and the world at large. It interprets original research and reports the meetings of learned societies in a way to enlighten the layman. The specialist is likewise a layman in every science except his own and he, too, needs to have new things explained to him in non-technical language. Scientific progress is so rapid and revolutionary nowadays that no one can keep up with it from what he learned at school. Science Service endeavors to provide life-continuation courses in all the sciences for newspaper readers anywhere in America without tuition fees or entrance examinations.

In a democracy like ours it is particularly important that the people as a whole should so far as possible understand the aims and achievements of modern science, not only because of the value of such knowledge to themselves but because research directly or indirectly depends upon popular appreciation of its methods. In fact the success of democratic institutions, as well as the prosperity of the individual, may be said to depend upon the ability of people to distinguish between science and fakes, between the expert and the pretender.

Science News-Letter, November 27, 1926

Mental Giants of History

Giving 301 of the geniuses of history an intelligence test is the latest feat of psychologists at Stanford University. The test was given to John Milton, Michelangelo, Napoleon, Samuel Johnson, and 297 other famous men and women born between the years 1450 and 1850. Results of the investigation have just been published by Dr. Catherine M. Cox, who was assisted by Dr. Lewis M. Terman, Lela Gillan and Ruth Livesay.

Historical records showing childhood traits and mental talents of the geniuses were used as a basis for giving out the intelligence ratings. John Stuart Mill, celebrated English philosopher and economist, was awarded the highest rank of all the 301 famous children. His intelligence quotient was placed at 190, which is 90 points higher than average mentality. At six years of age Mill wrote a history of Rome, and at eight he gave Latin lessons and was held responsible for the errors of his pupil.

Three children were given intelligence ratings of 185. Dr. Cox reports. These were Goethe, famous German poet; Grotius, who became a Dutch theologian, and Leibnitz, who won fame as a mathematician. Napoleon and Beethoven got ratings of 135 on their childhood mentality. Byron was given 150. Michelangelo got 145; Lincoln, 125; Mme. de Stael, 155; John Q. Adams, 165; Coleridge, 175; Washington, 125; Raphael, 110.

Dr. Cox explains that there was a tendency for characters whose childhood has been reported more fully by historians to get higher ratings, because full accounts brought out more evidences of precocity. The ratings are in many cases far too low, she says.

The investigation was conducted to shed light on the early mental traits of geniuses. Dr. Cox finds that generally eminent men and women show signs of superior mentality in early childhood.

"We are probably warranted in expecting superior adult achievement wherever in childhood the Intelligence Quotient is above 150," she states. "But we may not be warranted in expecting a world genius even if the 200 IQ is reached; for there are other factors involved in achieving greatness besides an essential degree of intellectual capacity."

Besides showing early signs of mental brilliance most of the 301 geniuses studied displayed strong character traits, particularly a persistence in following up a line that in-

terested them. Favorable heredity and environment make up the third important factor in the development of genius, according to the results of the investigation. Over three-fourths of the famous characters came from families of a good class, and there are many records of parents and associates giving them unusual opportunities for developing their creative gifts.

"The significant conclusion in the present study," Dr. Cox reports, "is derived from the evidence it presents that the extraordinary genius who achieves the highest eminence is also the gifted individual whom intelligence tests may discover in childhood."

Science News-Letter, November 27, 1926

MEDICINE

Cause of Measles

The cause of measles has been discovered, provided researches reported by Dr. N. S. Ferry of the Medical Research Laboratory of Parke, Davis & Company, Detroit, are substantiated by other investigators. The culprit is a streptococcus that is of medium size, grows in chains, and produces small germ colonies with green halos around them. Dr. Ferry has named it streptococcus morbilli. Using this germ, Dr. Ferry has made an antitoxin which when injected into the patient early enough in the course of the disease has prevented the appearance of the rash. This antitoxin, which is similar to that of diphtheria, has been found to protect against measles when injected into susceptible individuals. The measles toxin Dr. Ferry has made can be used to distinguish between those susceptible to measles in a procedure analogous to the Schick test for diphtheria, according to his claims. Dr. W. H. Park, veteran bacteriologist of New York City Department of Health who has been working with Dr. Ferry's germ and also that reported as associated with measles by Dr. Ruth Tunncliffe of John McCormick Institute, Chicago, indicated that more research will be needed before conflicts in evidence in various laboratories and clinics can be ironed off.

At present the most hopeful method of combating measles is through the use of convalescent serum made from the blood of those who have had the disease and just recovering. Dr. Park told how because of the limited quantities of this serum available it was being used on those very young children who are likely to contract pneumonia as an after effect of measles.

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NATURE RAMBLINGS

By FRANK THONE



65

A Marauder's Winter Quarters

Now that the leaves are off the trees it is easier to find the cocoons of caterpillars, not only the big ones that will yield beautiful moths if they are properly cared for, but the smaller ones that are the homes of species that prey on the leaves of our ornamental and fruit plantings.

Among the most common and most troublesome of these foliage-eaters is the bag-worm, whose very peculiar case may be found hanging by one end to a twig on almost any kind of tree or shrub, though it is said to prefer red cedar and arbor vitae. This case differs in appearance from most cocoons in that it is reinforced with bits of bark and fragments of dried stems, at once trophies and records of the places where the grub has been feeding.

The bagworm's case is peculiar in another respect, because it is one of the few coverings woven by caterpillars that are worn while the owners are still actively feeding. It serves as a protection against birds, wasps and other predatory enemies, and probably accounts to a large extent for the success of the creatures as pests.

If you find any of these bags hanging on the plantings about your yard you should by all means pluck them down and destroy them at once. Throwing them into the dead-leaf bonfire will turn the trick nicely.

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Paper money will stand being folded about 2,000 times before it breaks.

A new process of treating steel with ammonia is said to harden it as though it were tempered.

In a collection of about 1,000 average plants, white flowers were most numerous, and most fragrant.

Both chlorine and sodium in a free state are irritating and poisonous, but in combination they make sodium chloride, or common table salt.

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First Glances at New Books

INFLUENCING HUMAN BEHAVIOR—H. A. Overstreet—(3rd Printing)—*Norton*. (\$3). In a world that is full of bright young people with something to sell, "applied psychology" has become a touchword credited with magic powers. It is greatly to be hoped that solid books such as this one will eventually overcome and drive out the "courses in will power" and "keys to success"—high-sounding as drums, but as empty—that now flood the land.

Science News-Letter, November 27, 1926

EDISON—George S. Bryan—*Knopf*. This book goes beyond the usual popular-magician tale of the greatest of American inventors. It makes a real endeavor to get reliable data in orderly array, with definite citations from the mass of scattered Edisoniana. Very creditably also, it tells something of Edison's fellow-laborers and their contributions to the corporate reputation that is Edison.

Science News-Letter, November 27, 1926

PSYCHOLOGY—Everett Dean Martin—(7th Printing)—*Norton*. (\$3). Fairly complete, thoroughly up-to-date, written in short words and illustrated with homely and familiar examples, this book deserves its popularity.

Science News-Letter, November 27, 1926

MAGNETISM AND ATOMIC STRUCTURE—Edmund C. Stoner—*Dutton*. (\$5). The latest ideas of the relation of magnetism to the structure of atoms and molecules, and the radiation of energy.

Science News-Letter, November 27, 1926

THE NEW UNIVERSE—Baker Brownell—*Van Nostrand*. (\$4). A new "outline of history" from the beginnings of the solar system to the present, and including chapters on such topics as "Mind and Behavior," "Society Today," "Society Tomorrow" and "The Finalities of Life."

Science News-Letter, November 27, 1926

HOW WE BECOME PERSONALITIES—Edward Huntington Williams—*Bobbs-Merrill*. (\$3). An account of the way in which our glands make us what we are, and the possibility of controlling them.

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FATALISM OR FREEDOM—C. Judson Herrick—*Norton*. (\$1). A biologist tackles the old, tough riddle of determinism and decides in favor of free will.

Science News-Letter, November 27, 1926

HORSES, NOW AND LONG AGO—Lucy Sprague Mitchell—*Harcourt, Brace*. Horses, including little horses, and their story from the early eohippus to modern ones, intended for children from eight to twelve but interesting to all ages.

Science News-Letter, November 27, 1926

SUNDIALS—Arthur Robert Green—*Macmillan*. (\$4.25). A study of the peculiar vertical sundials, or "mass-clocks" found in medieval English churches.

Science News-Letter, November 27, 1926

BEYOND THE MILKY WAY—George Ellery Hale—*Scribner's*. (\$1.50). A little book on astronomy old and new, particularly valuable because of the attention it devotes to the almost unimaginably remote "island universes" of the spiral nebulae and stellar clouds.

Science News-Letter, November 27, 1926

NEW SCHOOLS FOR OLDER STUDENTS—Nathaniel Pepper—*Macmillan*. (\$2.50). A full account of methods of educating adults, such as the open forum, educational programs of corporations and art and science museums.

Science News-Letter, November 27, 1926

MYTH IN PRIMITIVE PSYCHOLOGY—Bronislaw Malinowski—*Norton*. (\$1). Tells of the efforts of "natural man" to find explanations for the riddles of the universe. Wisely, the author does not try to cram all lore into one short popular essay, but confines himself to a closer study of one Melanesian people.

Science News-Letter, November 27, 1926

SCIENCE AND POETRY—I. A. Richards—*Norton*. (\$1). A Fellow of Magdalene College essays the building of an obviously much-needed bridge.

Science News-Letter, November 27, 1926

WILD BIRDS IN CITY PARKS—Herbert Eugene Walter and Alice Hall Walter—*Macmillan*. (\$1.50). Condensed descriptions of 766 species of birds which have been seen in city parks, with easy analytical keys and charts of times and places of occurrence. A very useful pocket vademecum.

Science News-Letter, November 27, 1926

THE HISTORY OF WITCHCRAFT AND DEMONOLOGY—Montague Summers—*Knopf*. Material from the medieval witchcraft trials reviewed by a true believer. Sheds some light on the cult and more on the minds of the lords temporal and spiritual.

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ASTRONOMY

Ephemera

Quotation from **THE NEW ASTRONOMY**. By Samuel Pierpont Langley. Prof. Langley was the father of aeronautics, pioneer of solar study and for many years secretary of the Smithsonian Institution.

I have read somewhere a story about a race of ephemeral insects who live but an hour. To those who are born in the early morning the sunrise is the time of youth. They die of old age while its beams are yet gathering force, and only their descendants live on to midday; while it is another race which sees the sun decline, from that which saw it rise. Imagine the sun about to set, and the whole nation of mites gathered under the shadow of some mushroom (to them ancient as the sun itself) to hear what their wisest philosopher has to say of the gloomy prospect. If I remember aright, he first told them that, incredible as it might seem, there was not only a time in the world's youth when the mushroom itself was young, but that the sun in those early ages was in the eastern, not in the western, sky. Since then, he explained, the eyes of scientific ephemera had followed it, and established by induction from vast experience the great "Law of Nature," that it moved only westward; and he showed that since it was now nearing the western horizon, science herself pointed to the conclusion that it was about to disappear forever, together with the great race of ephemera for whom it was created.

What his hearers thought of this discourse I do not remember, but I have heard that the sun rose again the next morning.

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GENERAL SCIENCE

Experiments

In treating any particular subject I would first of all make some experiments, because my design is first to refer to experiments and then to demonstrate why bodies are constrained to act in such a manner. This is the method we ought to follow in investigating the phenomena of Nature. Theory is the general, experiments are the soldiers. Experiment is the interpreter of the artifices of Nature. It is never wrong; but our judgment is sometimes deceived because we are expecting results which experiment refuses to give. We must consult experiment and vary the circumstances, till we have deduced general laws, for it alone can furnish us with them.—Leonardo da Vinci: *Note Books*.

Science News-Letter, November 27, 1926

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Anniversaries of Science

December 8, 1903.—Unsuccessful attempt to fly the airplane designed and built by Samuel Pierpont Langley.

The data for the full-sized flying machine of Professor Langley tested October 7 and December 8, 1903, have not yet been published. From newspaper photographs it appears to be an amplification of the models which flew successfully in 1896, and this necessarily, would make it very frail. The failures, however, seem to have been caused by the launching gear and do not prove that this machine is useless. Like the failures of Maxim and of Ader, it does indicate that a better design must be sought for, and that the first requisites are that the machine shall be stable in the air, shall be quite under the control of its operator, and that he, paradoxical as it may appear, shall have acquired thorough experience in managing it before he attempts to fly with it. . . .

It doubtless will require some time and a good deal of experimenting, not devoid of danger, to develop the machine to practical utility. Its first application will probably be military. We can conceive how useful it might be in surveying a field of battle, or in patrolling mountains and jungles over which ordinary means of conveyance are difficult. In reaching otherwise inaccessible places, such as cliffs, in conveying messages, perhaps in carrying life lines to wrecked vessels, the flying machine may prove preferable to existing methods, and it may even carry mails in special cases, but the useful loads carried will be very small. . . . The power required will always be great, say some thing like one horsepower to every hundred pounds of weight, and hence fuel can not be carried for long single journeys. The north pole and the interior of Sahara may preserve their secrets a while longer.

—O. Chanute: *Aerial Navigation*, paper read before the American Association for the Advancement of Science, December 30, 1903.

Science News-Letter, November 27, 1926

ARCHAEOLOGY

Enemies Slain in Effigy

The childish trait of "taking it out" on an inanimate object when one has a fit of temper seems to have been a serious business in ancient Egypt. An archaeological expedition of the Berlin Museum has just returned from Egypt with 290 pieces of pottery, fragments of some 80 clay vessels, all written over with the names of foreign princes and peoples with whom the Egyptians of about 2000 B. C. were at war, together with a number of Egyptian names as well, presumably of rebellious communities. These names, it is believed, were inscribed on the vessels, which were then shattered with suitable ceremonies, in the belief that the foes would thereby be injured.

Science News-Letter, November 27, 1926

FOLKLORE

Blessed are the Wells

Large numbers of invalids and convalescents come every year to the noted medicinal springs at Buxton in Derbyshire, England, where the blessing of the waters was recently celebrated. This blessing of the waters is accompanied by the ceremony of well-dressing, an ancient practice common all over Derbyshire, which certainly goes back to the Roman period. The Romans were very skilled in finding healing waters, and it is quite possible that a tradition of their celebration of the festival fontinalia, the festival of the Springs, may have lingered on after they left Britain.

The custom of blessing the waters in spring is still kept up in the Mediterranean area and in the Balkans. It is performed regularly by the Greek Church over the waters of the Bosphorus, in Roumania at Bucharest, and it was an important part of South Russian spring ritual. It is possible, however, that in Britain it goes much further back than Roman times. Holy Wells are common in Britain and in the west and they are very frequent in Ireland. If they have any personal association it is usually with some saint, but there is no doubt that this saint is a pagan deity or spirit which has been Christianized.

Offerings are still made at these wells to obtain the fulfilment of a wish, and it is common to find pins and other small objects lying at the bottom of the well or spring, while rags and bits of ribbon or lace are to be seen fastened to bushes growing around or near. The well-dressing practiced annually at Buxton and in other parts of Derbyshire is more elaborate now that it is performed under the patronage of the Church and the municipal authorities. Elaborate pictures are constructed in a colored mosaic of mosses, lichens, and flower petals, representing some Biblical subject such as Christ and the woman of Samaria at the well, with the legend "Give me to drink," which was one of the subjects this year.

But it is clear that the whole practice is only an elaboration of the earlier primitive offering to the spirit of the waters and it is very significant that the construction of the pictures is in the hands of a few exponents of hereditary skill in design and execution who were rapidly dying out until the art was revived. Were they the descendants of a long-forgotten primitive priesthood who once ministered to the spirits of the waters?

Science News-Letter, November 27, 1926

Memory Rime

Again the Value of Pi

Prof. Otto Dunkel, of Washington University, St. Louis, has supplied us with a complete French rime for remembering the value of Pi to thirty decimal places, the number of letters in each word representing the digit in the proper order. It is from *Elementar Lehrbuch der Algebraischen Analysis und der Infinitesimalrechnung*, by E. Cesaro, translated into German by G. Kowaleski, Leipzig, Teubner, 1904. The first line was published in the *SCIENCE NEWS-LETTER*, X, p. 111, (Nov. 13, 1926):

Que j'aime à faire apprendre un nombre
3 1 4 1 5 9 2 6
utile aux sages!
5 3 5
Immortel Archimède, artiste ingénieur,
8 9 7 9
Qui de ton jugement peut priser la valeur?
3 2 3 8 4 6 2 6
Pour moi ton problème eut de pareils
4 3 3 8 3 2 7
avantages.
9

Science News-Letter, November 27, 1926

BIOLOGY—AGRICULTURE

Finds New Walnut

A native American black walnut, whose nuts split like those of the so-called English walnut, allowing the meat to come out in two even halves, is the promising find of Prof. J. Russell Smith of the Columbia University School of Business, who reports that he has several grafted specimens growing on his farm near Round Hill, Va. The hard, woody partitions in the shell, that make so much work for the nutpick in ordinary black walnuts, are lacking in the new variety, which probably arose as a chance mutant, or "sport," in the natural timber.

It is pointed out that native walnut trees of this kind offer considerable promise for the development of an American nut growing industry. "English" walnuts, which in point of fact came to this country from Spain and southern France, are too tender to grow profitably north of California, Florida and other southern states, whereas the native black walnut thrives in the woods clear up to the Canadian border and beyond.

The Northern Nut Growers Association, of which Prof. Smith is a member, is offering a prize of \$50 for the discovery of the best black walnut trees in America.

Science News-Letter, November 27, 1926



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